

THE BIGGEST FERRIS WHEEL IN THE WORLD

## Join our passion for spoked wheels

Foto: ANP



**The London Eye**, the biggest Ferris\* wheel in the world, is essentially a bicycle wheel. For the Dutch engineers who built the wheel, a tensioned-spoke design was the only viable option for this mega-wheel (135 m in diameter). To support the 32 glass-and-steel gondolas in a safe way, the most crucial factors were the wind, the weight and the rigidity (not surprisingly: the very requirements for a bicycle wheel...). The wind engineering is one of the most innovative technologies of the whole project. The 128-wire spoke design absolutely has the best aerodynamics. Most of the 1600 tonnes of steel have gone in the one-sided support of the wheel, the underground anchors and the spindle. The wheel itself (hub shell, spokes and rim) weigh 320 tonnes. "The highest tension on the cables connecting the hub with the rim had to be withstood only once," Hollandia project manager Peter Koorevaar says, "that was when we had assembled the wheel on a big barge on the river Thames, and it had to be lifted from a horizontal plane to its actual vertical position. According to our calculations, it would never again have to stand lateral forces as big as these. In fact, the construction could have been still lighter if we could have built the wheel in an upright position."

For comparison with standard bicycle wheels: the London Eye has a side deviation of 6 cms on a 135 m diameter. Calculated back to the precision of a 622 mm bicycle rim, the tolerance would be 0.3 mm, which is not an extraordinary value. But scaling down the weight to a standard bicycle wheel, the London Eye with its open rim and cobweb-thin spokes would weigh only 40 grams! If the Millennium wheel would have fitted in our machines, then we would have trued it.

The London Eye (its official name is the Millennium Wheel) is sponsored by British Airways. It is open daily, and a ride takes 30 minutes. Bookings can be made through 0044 870 5000 600. More information on [www.ba-londoneye.com](http://www.ba-londoneye.com)

Our passion at Holland Mechanics for spoked wheels means also a passion for the Millennium Wheel. Join our passion, do a round in the London Millennium wheel and we'll gladly reimburse your fare during the remainder of the Millennium year.

\*A fairground wheel or Ferris wheel is named after U.S. engineer G.W.G. Ferris (1859-1896) who built the then biggest wheel for the Chicago World Fair in 1888.

### From the editor

Any questions about issues in this magazine? Please send these to the HM Today editing team: Anecdotes on wheelbuilding in broadest context – historical, incidental, or in any sense instructive – will be rewarded when published in this magazine. Send your contributions to:  
P.O. Box 373, 1440 AJ Purmerend,  
The Netherlands  
Fax: +31-299430674 or  
E-mail: [office@hollandmechanics.com](mailto:office@hollandmechanics.com)

### SMT semi-automatic truing jig

**Traditional high-quality** wheels or wheels with inverted spokes (nipples in the hub) can be found on today's exotic bicycles. Exclusive wheels, in small numbers, for the connoisseur. These wheels have to be trued to exact tolerances with special spoke wrenches (there is no room for the traditional key ring or the robot's arm). The old race mechanic could do the job, but it will get more and more difficult to find the skill and the experience to true a perfect high-end wheel to exacting tolerances. That's why Holland Mechanics have built a semi-automatic hand truer, SMT (SMart Truer). On the SMT, special wheels from 12" to 30" with any number of spokes up to 48 can be trued to a 0.05 mm tolerance. The trick is, that the jig's sensors and computer offer the truing directives for each nipple and for each truing round. The operator only has to perform according to the SMT's instructions, and the perfectly trued wheel will be ready within 3 minutes. The necessary skills are limited to reading the instructions, and giving the tool the required number of turns. (The SMT can also be used when a full robot is not profitable). Of course, the SMT has excellent ergonomics (a prerequisite for a high output per day), and it is fully compatible with the overall digital control network of the wheelbuilding shop. It can be interlinked with the Robot SG wheel database, and it is ready for STA (Spoke Tension Analyser), data-export and a (label) printer.



## CN Lacer



**Holland Mechanics** is working on the introduction of a new and very flexible lacing machine. The properties which make the CN lacer different from the existing lacers is its capacity to lace big hubs into small rims. Really big-diameter hubs are, for instance, electric power-assist units for pedelecs. These will always have a crosswise spoke pattern (never radial), and often a 26", a 24" or even a 22" rim. This results in relatively sharp angles for the spoke where it meets the tangent of the rim. Similar sharp angles can be found when small rims (12") have to be laced. Equally, doublewall or triplewall rims, and high-profile rims sometimes have nipple holes drilled (or punched) under an angle. To cope with this, the nipple screwdriver has to be very flexible. That's what the layout of the new CN lacer is about. Holland Mechanics is keeping the pace with the providers of the motor wheels. When the motor wheels will be available on a production scale, mechanical wheelbuilding for pedelecs is a must.

## Holland Mechanics: worldwide digital services



**Holland Mechanics** has been working hard to be full-scale digitally attainable. [www.hollandmechanics.com](http://www.hollandmechanics.com) has a lot of new possibilities, like downloading our product folders and mpeg video's. And it has the new HM Service Desk, HMSD in short. HMSD is more, it is a full, mutual support with a internet enabled Knowledge Base. We are looking for the right words to express what that means. In cyber-language one could say: the Holland Mechanics Service Desk is interactive, but it is different. HMSD is personal. Our customers can hand over their problems online and get a tailored-to-size answer. Nothing gets lost: every customer has a unique reference number and gets a issue number for his question. At any moment, customers can ascertain themselves about the status of their issue. Visiting HMSD will give them the picture of their service account manager. Check in with [office@hollandmechanics.com](mailto:office@hollandmechanics.com) with your url and e-mail address, and we are just as near as your neighbour.

## Reader's Letters

Dear Holland Mechanics,  
At Interbike I picked up a copy of your newsletter HM Today. I am very impressed. This is an excellent newsletter! Can you add my name to your mailing list, and can I have any back issues available. (My company, Cannondale, is a customer who uses HM equipment in our Pennsylvania USA factory).

David Campbell, Director of technical services,  
Cannondale Corporation.

(You don't need to be a HM customer to pick up our newsletter-HM)

TO: Mr. Jan Peereboom, Holland Mechanics  
FROM: Orbea. Mrs. Fernandez & Landa  
DATE: Mallabia, 18 th August 2000

Dear Mr Peereboom,

In answer to your fax dated last 26th. July Ref.: JP/IL about the coming Bicycle Shows, Orbea will send to Holland Mechanics 10 pcs. 12'5 " wheel samples to use in the robot DTI.

About our experience with the robot, we can tell you some features:

In the past two years, Orbea has been making an impressive technical effort in machine improvements, such as wheelbuilding machines. Nowadays the quality standards have increased not only in final developed products but also in service to our customers, so that means flexibility and accuracy. Fobot DTI fills the gap between simplicity and versatility and with its technical possibilities it has become a very necessary machine in Orbea. One of its best properties is that the operator can simply choose a known wheel type from the machine's memory as every type of wheel has previously been stored. This means that a new wheel identity has to be taken only once.

Other possibilities, such as the automatical torque angle adjustment, permit a high wheel trueing production with very good quality definition (height-side-and center tolerances).

All these new possibilities have permitted to Orbea a major definition in quality and service.

I hope that this information will be of your interest.

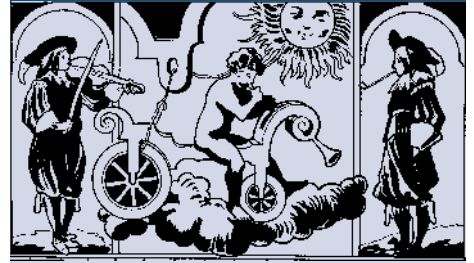
Best regards,

ORBEA.SCOOP.  
Alfonso Fernandez  
Production Manager.

Our strategy is based on pro-active management that will focus on your business processes, wherever on the globe you are and whatever your local state of technology is. We may be bothered with your problems-that's the very goal of our joint effort to optimise wheelbuilding.

Still, our service managers travel around the world. One of their tools is their laptop computer. With the ever-increasing possibilities in memory and speed, the computer of the service manager has an extensive knowledge base, it can e-mail and exchange information with the Netherlands head office, it carries a scoop, it has calculation programmes, control programmes (Spoke Tension Analyser) and can use HMSD online. Regardless of local time versus European continental time, a service manager on the road is as completely equipped as if he were at the Holland Mechanics headquarters. That means that he does not waste his time, or yours.

## W H E E L - L O G I C



**First bicycle?** Can you beat that? Apparently a bicycle, with a seraphin blowing its trumpet in the saddle. This picture can be seen in a window made in 1642 in the Saint Giles church of Stoke Poges, England. Nobody can tell whether it is the phantasy of the 17th century painter, or the memory of an eyewitness. In any case, it is a one-off, like the flowered bicycles depicted on Indonesia's most famous temple, the Borobudur. These bicycles may be forgeries insofar that they can have been applied during one of the many restorations on the jungle-besieged structure. Other probable fakes are the bicycle by Leonardo da Vinci (1480) of which dozens of replica's adorn several museum collections, and the 1837 treadle-driven bicycle by Kirkpatrick MacMillan from Dumfries, Scotland.



Although it cannot be denied that the early 19th century Galloway region burst with technological inventive power, all necessary materials were present, and the time was certainly ripe for it. Nevertheless, British and Scottish historians have their doubts about the authenticity of the MacMillan bike. First to fit pedal propulsion, first to take patents and first to start building bicycles factory-wise was Ernest Michaux of Paris (1862).



The first wheel built with tensioned wire spokes was the Ariel built by James Starley in 1870.

**First tensioned spokes** The radial spokes were tensioned by turning the hub in relation to the rim, by means of twin tensioners within the spoke network, which were easy to tune but the system had the drawback that all spokes were slightly tangent in one direction. During that same period Frenchman Meyer built the first spoked wheel with individually-tunable spokes. All previous bikes had had solid spokes supporting the hub from the rim where it touches the ground, whereas the Ariel and Meyer idea was to suspend the hub from the rim in its highest point. Wheels with tensioned spokes must be considered as one of the three main inventions of the bicycle: the pedal drive, the tensioned spoke (which halved the weight of the bike, and doubled the speed) and the inflatable tyre.

## W H E E L - L O G I C



**Matchsticks** In the wheelbuilding-by-hand era, most drum brakes had a small and a big flange. The smaller side had two-by-two spoke slots instead of single spoke holes, so that the spokes could be hooked in instead of inserted. Most wheelbuilders filled the hub on the drum side, laced them in the rim and worked their way around on the smaller flange side. Or they inserted both sides first, needing 18 matchsticks to keep the small-flange spokes in place.



**Constrictor spoke** Some ideas pop up every generation. Like the 'constrictor' spoke pictured here: it is said to be endless, but it has threads on both sides. So one double spoke runs from a spoke hole in the rim around a rivet in the hub flange, and hence to another spoke hole in the rim. Truing one spoke means adjusting two nipples instead of one (there is a little friction around the rivet). Basically the same idea can be seen, for instance, in some ordinaries of 1880, and in cheap children's bicycles of the 1960 period. A couple of years ago, the 'revolutionary' idea was brought out again, this time with two Kevlar 'spokes', each running all the way around on one side of the wheel. The trouble is, that breaking one spoke means that you have only one left, which is not enough.



**Rebour** Often, things can be explained easier with a drawing than by words. A drawing may be even better suited than a photo. In the early days, most cycling magazines had their own artist, who with pen and ink made line drawings. The French cycling monthly *Le Cycle* engaged Daniel Rebour in the early 'thirties. He became famous for his excellent line drawings of technical features. Once his skills had been recognized, Rebour was invited to draw anything concerned with bicycles and cyclomoteurs in France. Opening a 'fifties catalogue of, for instance, Huret derailleurs, Mercier racing bicycles, VAR tools or Mobylette mopeds, invariably show the accurate Rebour drawings. Rebour drew this picture of the Preciray hand truing stand in the period before Holland Mechanics invented their mechanical truing machine.

## Robot DA: A million wheels



Master Wheelbuilder Bill Hencke: "With the Holland-Mecanics history, why use anything else?"

**Santa Ana, California**-Back in 1984, Bill Hencke started wheelbuilding as a business in a garage in Santa Ana, making wheels on demand for a couple of clients who hand built small numbers of special bicycles: the hottest racers, lightweight tandems, the kind of thing you'd like for yourself. Bill Hencke started building wheels by hand, and his business expanded. With several builders, Hencke's company Sta-Tru still did everything by hand. But when they learned about Holland Mechanics and its reputation for reliable wheelbuilding equipment, the decision to buy a CF Lacer was rapidly taken. It helped Sta-Tru to expand still further: it could supply a small army of hand truers. However, several different people doing the



hand truing made it very difficult to ensure the consistent quality the customers demanded. The logical solution was to employ a Robot DA. In 1988 it arrived, and Sta-Tru has grown ever since. Bill Hencke writes: "To this day I'm amazed how versatile and reliable this machine is. The usual wear parts get changed but everything else doesn't wear out. From 48 spoke 20" wheels to alloy nipple equipped 700C road wheels it works hard every day and never takes a lunch break." When the counter of the DA neared 1.000.000, Bill Hencke had a special all-gold plated wheel ready to take the honours.

With over one million wheels trued, the machine continues to contribute daily. Sta-Tru now produces over 175,000 wheels annually, all on Holland-Mechanics machinery.

## HFS Hub filler at work



**Two years after** its announcement, the Holland Mechanics HFS hub filler has been sold to several customers in Holland, Germany, the USA, Canada, Belgium, Italy, France and Portugal. The machine has proven to be ultra-reliable when doing what it is made for. So far, the Hub filler can insert spokes in any type of flanged hub with any number of spoke holes. On the distance between the spoke hole and outer diameter, Holland Mechanics is in regular contact with the worlds' major hub producers to have the basic requirements for mechanical wheelbuilding imple-

mented in the prototype stage, so that wheelbuilders will be willing to specify these hubs when they reach the production stage.

Before buying a HFS, one of our clients had a most astonishing lady working in their wheelbuilding department. She could fill a hub by hand faster than your eye could register. In high season, she was prepared to run double shifts to supply the lacers. It seemed a paradox to buy an expensive machine to replace her immaculate handwork, but at second thought it did not seem such a bad idea at all. Although the lady was very fast, she got tired by filling the hubs day in day out. That made the management decide to buy a Hub filler, she now happily controls two machines. This indicates that the machine is much more reliable when it comes to illness, injury of the hands, etc. What's more: hub filling is often done in prisons, social workplaces and other working force outside the factory. That means the hubs and spokes have to be transported vice versa, mixing up of two different spoke lengths is not imaginary, buffer stocks are necessary, etc. With today's experience in figures collected from our users, we can already say that a hub filler in regular use pays off. Some of the Stations have already filled more 400.000 hubs.

## Wheel ID

**is the name** we gave our newest developed software. This module identifies automatically each individual wheel type. The Idea behind WheelID is that our robot SG can become even more flexible and more specific for production and quality requirements. This means higher production output when possible and higher wheel quality when needed. By adding wheels to the database you have specified a new wheel type. The machine will true that particular wheel type again at any notice with the fixed parameters through recognition. Making bicycles will require more flexibility as the demand for custom-built bicycles increases. Bicycles will be more and more built to specification and on custom order, and even wheelsets will be built for the individual client. The Wheel ID programme specifies the deterministic parameters of the wheel (dimensions, spoke number, spoke pattern, asymmetric, front/rear, etc.) and the truing parameters (the deviation tolerances, the correcting and tightening rounds,

truing parameters			
side deviation	0.3	rounds with height correction	8
height deviation	0.3	rounds without height correction	1
corner tolerance	0.4	reverse torque left	85
out of center	0.4	reverse torque right	108
side deviation round	0.3	nipple clamp ratio	high
height deviation round	0.5	lighting rounds	3
out of center round	0.3	profile correction	0

the torques etc.). These parameters can be stored for future use, and the programme will recognise any similar laced wheel entering the machine. This saves lots of time for the wheelassembly department who will also do small batches (and even one-offs) for custom clients.

## Language modules



The machine's screen is intended to support the operator, and not to puzzle him (or her). So we have tried from the first generation of machinery with a full-screen computer display to bring the information in the operator's own language. This has been implemented for a wide range of letter-based languages (German, French, Italian, Spanish, Portuguese, Polish, etc.) and recently we have given our affidavit to the Chinese versions of our lacing and truing programmes. For people who read and write letter-based languages it is difficult to understand that reading and writing in Chinese is a life-time study with new characters emerging almost daily: the more you read, the more unknown characters you meet. But the Chinese operator of HM machinery will soon know what his (or her) control screen has to say.

## COSMOPOLITES

Although Holland Mechanics operates worldwide, the core team is very local, from the north-of-Amsterdam region. From the former fishermen's communities, most of our people feel easy when travelling, but glad when back home. Community ties are strong, and to have a pleasant day off, Holland Mechanics just invites everybody with their bicycles along for a day trip to the mills of Zaanse Schans, where in the early 17th century the first cocoa and exotic timber was brought ashore in Europe. The cycling is easy: wind ahead means tailwind on the way home. And signposts with red letters mean: bicycles only.



Also at the Zaanse Schans, mr. Ma Hai Min met mr. Van Doornik of Holland Mechanics. For mr. Ma it is much easier than for Holland Mechanics (with nobody really proficient in Chinese and in the China business culture) to scout the Chinese market for mechanisation of the bicycle industry. Although manual labour is still cheap in China, two big bicycle manufacturers have bought a complete line of Holland Mechanics wheelbuilding equipment so far, and both mr. Ma and Holland Mechanics are confident that many more will follow. Because not only in labour cost, but also in the consistency of the product, the machine-built wheel is superior to the handbuilt wheel.

## International Show Calendar

\* and the shows where Holland Mechanics will be on exhibit.

13-17 september	Intermot Munich, Germany
15-18 september	IFMA Cologne, Germany *
	Halle 13.2 Stand H10/J11
16-19 september	EICMA Bici Milan, Italy *
	Pad. 2 Stand P05 F
24-27 september	Interbike Las Vegas, USA *
	Stand 3101
29 sept.-1 oct	Norsykkel Show Oslo, Norway
13-15 oktober	Bicycling Australia Show Melbourne, Australia
19-22 oktober	Bicykl 2000 Poznan, Poland *
26-29 oktober	Cycle 2000 Bilbao, Spain *
10-12 november	Japan International Cycle Show Tokyo, Japan
19-24 november	Riyadh Motor Show Riyadh, Saudi Arabia

## Nomination Export Award

Holland Mechanics is nominated for the Dutch Export Award. For Holland, export is a must: the small, most densely populated country in the world cannot survive without exports. Flowers and vegetables still contribute a substantial share to the trade balance, but Holland also has a long-standing tradition for technology exports, with often highly specialist, intelligent products. Like offshore services, mega-heavy haulage, optical systems or wheelbuilding equipment. This year, from the selection rounds three candidates remained: Gatsometer, the people who build the police speedtraps used in many countries around the world, Kenz Cranes (who have delivered over 160 high-capacity cranes, thus becoming the third-overall crane builders in the world by total lifting capacity) and Holland Mechanics. Managing director Jos van Doornik is very glad with this nomination, which reflects the company's thirty-year long history of inventiveness, dedication and holding-on. "It's a homage to my father, who was the founder of this company in 1971," Jos van Doornik says, "it's a recognition of his work, and of our sound business contacts and relations around the world. And that's a tribute to our workforce." Holland Mechanics (50 employees at the home base in Purmerend, Holland) shows that relatively small companies can be successful global players.

## HOW MANY?

When Huff, one of the biggest bicycle producers in the USA, moved their production facilities from their Farmington, Mo plant to Mexico, Holland Mechanics had the opportunity to get back the first truing machine they sold to Huff in 1977. The machine is now back at the Purmerend, The Netherlands headquarters of Holland Mechanics. Its counter shows an incredibly high number of wheels produced so far. Our record of the machine shows that it has worked all these years with only standard maintenance and no real problems whatsoever.

We ask you to make a guess how many wheels have been trued with this machine:

- a. 677.514
- b. 1.355.028
- c. 2.710.056
- d. 3.509.088

Send your postcard with the estimated number to our office, or e-mail your estimate to [office@holland-mechanics.com](mailto:office@holland-mechanics.com). Among the good solutions we raffle off a 20 kg Dutch Edam cheese and a pair of original HM wooden shoes.



Holland Mechanics workshop engineer Ruud Arends is proud of his new Fanuc Robodrill. This new CNC machine gives us the highest precision in the production of parts for our wheelbuilding machinery, and it adds to greater efficiency, being very flexible.

## Makers' badges

Metal bicycle headshields have become collectables: Some bicycle manufacturers still fit an embossed and/or screen printed metal nameplate to their products, but often the "headshield" is just a sticker, a transfer or a plastic gadget. But in the past century these plates often have been very ornamental, sometimes in cast or wrought metal with glass enamel colouring and even silver or gold plating. Many bicycle retailers have put some of these highlights aside, and have collections of the local makes. But some serious collectors have collections of several hundred different plates. One of our relations has started to collect the headshields 30 years ago, looking at scrapyards with a sharp chisel. His oldest plate comes from a 1868 Michaux (found in a coin collector's shop), but several other pre-1900 headshields came from scrap metal, from frames in the Amsterdam canals or from a gen's bike lying in the bush with a one-foot thick tree growing through the frame triangle. With the gradual disappearance of the derelict scrapheap nurturing its treasures for years, new acquisitions came more and more through exchange with other collectors, leading to a collection of nearly 3000 different plates from 37 different countries, with such rarities as bicycles from Madagascar and Cameroon. Many headshields have an interesting story to tell (see box). Any collectors among our readers? Let us know...

### Legnano

Ah! Legnano! Most famous battleground of the Italian peninsula! In 1176, Alberto da Gussiano beat Frederic Barbarossa in the battle of Legnano to establish the first Italian kingdom. It inspired Giuseppe Verdi to compose his overture "Bataglia di Legnano", at least as heroic but less known than Tsjaikowski's Overture 1812.

Alberto da Gussiano was chosen as a mascot for this equally famous bicycle make. Legnano was no

less than 11 times winner of the team prize in the Giro d'Italia: 1922, 1923, 1925, 1926, 1927, 1929, 1931, 1932, 1933, 1936, 1957. Famous names rode the all-yellow bicycles: notably Alfredo Binda, three times world champion who was so strong that he got a generous fee to skip the Giro d'Italia from his programme (he won the Giro five times) to ensure an interesting battle for the voluntarily vacated throne between more equal contenders. Probably the most famous name who ever rode for Legnano was Gino Bartali, who won the Giro d'Italia five times, and the Tour de France twice, in 1938 and 1948 (with six years of war in between). After the one and original Legnano went bankrupt in the 'fifties, the name became an object of trade, and was used indiscriminately on far less noble bicycles.

